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मानक

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Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 4312 (1967): Code of safety for lead and its compounds  
[CHD 8: Occupational Safety, Health and Chemical Hazards]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”



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IS : 4312 - 1967  
( Reaffirmed 2009 )

*Indian Standard*  
CODE OF SAFETY FOR LEAD AND  
ITS COMPOUNDS

( First Reprint JULY 1982 )

UPC 661.85:614.8



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INDIAN STANDARDS INSTITUTION  
MANAK BHWAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

*December 1967*

**AMENDMENT NO. 1 DECEMBER 2006**  
**TO**  
**IS 4312 : 1967 CODE OF SAFETY FOR LEAD**  
**AND ITS COMPOUNDS**

*(Page 4, clause 3.1, first sentence)* — Substitute the following for the existing:

'The maximum recommended allowable concentration of lead and its compounds is 0.05 mg/m<sup>3</sup> of air.'

*(Page 4, clause 4.1.3)* — Insert the following new clause after **4.1.3**:

**'4.1.4** Confirmed animal carcinogen with unknown relevance to human.'

*(Page 5, clause 5.2)* — Insert the following new clause after **5.2**:

**'5.3 Incompatibles** — Lead reacts vigorously with strong oxidizers, such as hydrogen peroxide and chlorine trifluoride, and active metals, such as sodium and potassium. Powdered lead metal in contact with disodium acetylide, chlorine trifluoride, sodium carbide or fused ammonium nitrate poses a risk of explosion. Solutions of sodium azide in contact with lead metal can form lead azide, which is a detonating compound. A lead-zirconium alloy (10-70 percent Zr) will ignite when struck with a hammer.'

*[Page 5, clause 7.2.1(a)]* — Substitute the following for the existing:

'a) In addition to the pre-placement medical examination, annual regular medical examination should be carried out.'

# *Indian Standard*

## CODE OF SAFTY FOR LEAD AND ITS COMPOUNDS

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(Continued on page 2)

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## IS : 4312 - 1967

( Continued from page 1 )

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# *Indian Standard*

## **CODE OF SAFETY FOR LEAD AND ITS COMPOUNDS**

### **0. FOREWORD**

**0.1** This Indian Standard was adopted by the Indian Standards Institution on 14 June 1967, after the draft finalized by the Chemical Hazards Sectional Committee had been approved by the Chemical Division Council.

**0.2** The soluble salts of lead are highly poisonous. Lead poisoning is caused when a person is exposed to dust of lead metal or its compounds or fumes of hot metal. It is a cumulative poison. Absorption of lead takes place through the skin, lungs or the gastro-intestinal tract.

**0.2.1** A knowledge of actions and effects of dangerous materials on biological systems is always desirable in order to properly utilise any existing code of safety or to add further refinements to it. This code of safety recommends practices to be followed to ensure safety of the personnel engaged in lead based industries.

**0.3** This standard is one of a series of Indian Standard codes of safety for hazardous chemicals. Other standards are:

IS : 4262-1967 Code of safety for sulphuric acid

IS : 4263-1967 Code of safety for chlorine

IS : 4264-1967 Code of safety for caustic soda

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### **1. SCOPE**

**1.1** This standard prescribes a code of safety for lead and its compounds. It recommends practices to be followed to ensure safety of personnel in any area of a factory where metallic lead, lead alloys or lead compounds (excluding organic compounds of lead) are produced, handled or used.

### **2. TERMINOLOGY**

**2.1** For the purpose of this code, the definitions of the terms given in IS : 4155-1966\* and IS : 4167-1966† shall apply.

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\*Glossary of terms relating to chemical and radiation hazards and hazardous chemicals.

†Glossary of terms relating to air pollution.



**IS : 4312 - 1967**

### **3. THRESHOLD LIMIT VALUE ( TLV )**

**3.1** The maximum recommended allowable concentration of lead and most of its inorganic and organic compounds is two milligrams of lead per 10 cubic metres of air. For lead arsenate the corresponding figure is 0.15 milligram of lead per cubic metre of air.

## **4. HAZARDS ASSOCIATED WITH LEAD AND ITS COMPOUNDS**

### **4.1 Health Hazards**

**4.1.1** When taken for a considerable length of time in small doses, especially in the case of oxides and carbonates, chronic lead poisoning is observed. Lead poisoning is cumulative, only a fraction of the dose ingested is excreted and the remainder is stored in the tissues, mainly in the bones, until finally the amount retained in the body produces toxic symptoms.

**4.1.2** Chronic lead poisoning causes pain in the abdomen, constipation, loss of appetite, thirst, and general emaciation followed by nervous prostration known as lead-palsy and epileptic fits followed by total paralysis. Sometimes a blue line may be observed in the gum margins; by itself this is indicative of lead exposure and not of lead poisoning.

**4.1.3** A usual finding in all cases of lead poisoning is anaemia. Some of the red cells show an alteration in appearance, known as basophilic. In the more severe and more chronic types of exposure, the clinical findings may be principally those of a severe peripheral neuritis with wrist drop, due to weakness of the extensor muscles of the wrists. In right handed persons the right wrist may be more severely affected than the left and *vice versa*. Following excessive absorption, the central nervous system may be affected, with convulsions, loss of consciousness and other symptoms indicating an encephalopathy. A long term result of an intoxication may damage the blood vessels, particularly those of the kidneys with kidney disease a consequence.

## **5. STORAGE**

**5.1 Storage for Dress** — A suitable container with tightly fitting cover shall be provided and used for dross as it is removed from every melting pot. Such containers shall be kept covered while in the work-room near the machine except when the dross is being deposited therein. Where possible, refuse should be re-used or sold, but refuse which cannot be dealt with by these methods should be destroyed by fire and the burning of materials should be placed under the control of one person who should be made responsible for the use of correct method of disposal.

**5.2 Storage of Process Materials** — Arrangements should be made for the temporary storage of materials required in the process, and also for the stacking of finished products. White lines or other lines of demarcation should be drawn to indicate the areas for the material to be stacked. Sufficient space should be left between the bags or containers to allow free passage of men and transport.

## **6. PACKING AND LABELLING**

**6.1 Packing** — Lead scrap, dross and lead compounds should be packed in polyethylene lined hessian bags or steel drums. The type of packing should depend on the nature of individual material and should meet the requirements of customer.

**6.2 Labelling** — No special type of labels is required for containers of lead and its compounds but all the containers should be suitably and meaningfully labelled.

## **7. PREVENTIVE MEASURES**

**7.1** The following general principles shall be observed for the protection of the body against the effects of inhaling toxic materials:

- a) No person shall be exposed to an atmosphere that is or may be injurious to health.
- b) Where possible, (i) hazards should be prevented by the correct design of buildings, plant equipment, and by correct working methods and conditions; and (ii) hazards which cannot be prevented should be controlled at or near the source.

### **7.2 Employment and Personnel**

#### **7.2.1 Medical Examination**

- a) All new entrants should undergo a preplacement medical examination and all employees should be regularly examined.
- b) The examination should include urine and blood analysis to determine the degree of absorption.
- c) Those workers having symptoms like anaemia, nervous or kidney disorders, etc, should be given change of occupation.

**7.2.2 Certificate of Fitness** — A person medically examined as in 7.2.1 (a) and found fit for employment should be granted a certificate of fitness by a certifying surgeon and it should be recorded in the prescribed health register and this record should be maintained by the manager or any authorised person.

**7.3 Exhaust Draught** — Where during processes, dust or fumes from lead and lead compounds are given off and employees are likely to be exposed to the dust and fumes, effective measures, including, where practicable, provision of efficient exhaust draught to reduce the concentration to below the recommended threshold limit value given in 3.1, should be taken.

**7.4 Protective Outfit** — Suitable protective clothing in a clean condition should be provided by the employer and worn by the persons employed. Respiratory protective devices should also be provided to the workers who are liable to be exposed to air-borne dust or fumes.

**7.5 Food, Drinks, etc, in Work-Rooms** — No food, drink, *PAN*, *SUPARI*, or tobacco should be brought into or consumed by any person in any work-room and no person should be allowed to stay in any such room during intervals for meals or rest.

**7.6 Cleanliness of Work-Rooms, Tools, etc** — The rooms in which the persons are employed, and all tools and apparatus used by them, should be kept in a clean condition. The following precautions should also be taken:

- a) Certain processes, where high concentration of lead dust and fumes are likely to be given off, should be effectively separated from the rest of the operations;
- b) Floors of such rooms in which lead processes are carried out should be of impervious material. They should be cleaned daily after being washed and maintained in good condition;
- c) Scrap material should be removed as often as is necessary; and
- d) Work benches, machines and tools should be kept clean.

## 7.7 Personal Hygiene

**7.7.1 Cloak Room** — A suitable cloak room should be provided for clothing put off during working hours, with adequate arrangements for drying the clothing, if wet. Workers should change clothing before work starts and they should change to street clothing after bath at the end of day's work.

**7.7.1.1** A place, or places shall be provided, separate from the meal room for the storage of overalls or working suits. The latter should be cleaned at frequent intervals and immediately, if contamination is established.

**7.7.1.2** These accommodations should be kept clean.

**7.7.2 Lavatory Washing and Bathing Accommodations** — A covered lavatory with sufficient number of towels, soaps or other suitable cleaning agents and nail brushes should be provided. For washing either (i) a trough, with a smooth impervious surface fitted with a waste pipe without plug, allowing at least 60 cm for every person at any one time, having constant supply of

clean water from taps or jets above the trough or (ii) at least one wash-basin for every person employed at any one time fitted with a waste pipe and plug and having a constant supply of clean water, should be provided.

**7.7.3 *Care of Hands*** — Where contamination of the hands by poisonous substances is possible, particular attention should be given to the finger nails which should be kept clean and short.

**7.7.4 *Care of Mouth*** — Mouth should be cleaned regularly and particularly at the end of shifts or before taking meals. Arrangements should also be made for the workers to be examined for signs of decay of teeth, if any, at regular intervals.

**7.7.5 *Care of Hair*** — Hair should be kept reasonably short and should be covered where persons are employed on processes where dusts or other poisonous fumes are involved.

# INDIAN STANDARDS

## ON

### Chemical and Allied Hazards

IS:					Rs
1260-1963	Code of symbols for labelling of dangerous goods	...	...	...	2.00
1446-1959	Classification of dangerous goods	...	...	...	5.00
1913-1961	Electric light fittings, general and safety requirements for	...	...	...	2.50
2551-1963	Danger notice plates	...	...	...	1.00
2553-1964	Safety glass ( <i>revised</i> )	...	...	...	2.50
2925-1964	Industrial safety helmets	...	...	...	4.50
4155-1966	Glossary of terms relating to chemical and radiation hazards and hazardous chemicals	...	...	...	7.00
4167-1966	Glossary of terms relating to air-pollution	...	...	...	5.50
4262-1967	Code of safety for sulphuric acid	...	...	...	3.50
4263-1967	Code of safety for chlorine	...	...	...	6.00
4264-1967	Code of safety for caustic soda	...	...	...	3.50
4312-1967	Code of safety for lead and its compounds	...	...	...	2.50

# INTERNATIONAL SYSTEM OF UNITS ( SI UNITS )

## Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

## Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

## Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg m/s <sup>2</sup>
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V/s
Flux density	tesla	T	1 T = 1 Wb/m <sup>2</sup>
Frequency	hertz	Hz	1 Hz = 1 c/s (s <sup>-1</sup> )
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure	pascal	Pa	1 Pa = 1 N/m <sup>2</sup>

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